

Last Name	
First Name	
Legi-No.	
Branch of Studies	

Written Exam
Supramolecular Chemistry (OC VII)
Fall 2005

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Please check:

This exam paper includes 4 pages (in addition to the cover).

Please note:

- All problems have to be solved.
- Unreadable texts or drawings will not be credited any points.
- If you use additional sheets, make sure to mark them with your name and attach them to this paper.

Points

Problem 1	
Problem 2	
Problem 3	
Problem 4	
Total	

Grades

Written	
Oral	
Final	

Problem 1

a. In chloroform, guanosine-cytidine conjugate **1** self-assembles into a trimeric supramolecule. Draw the trimeric structure and indicate the intermolecular interactions.

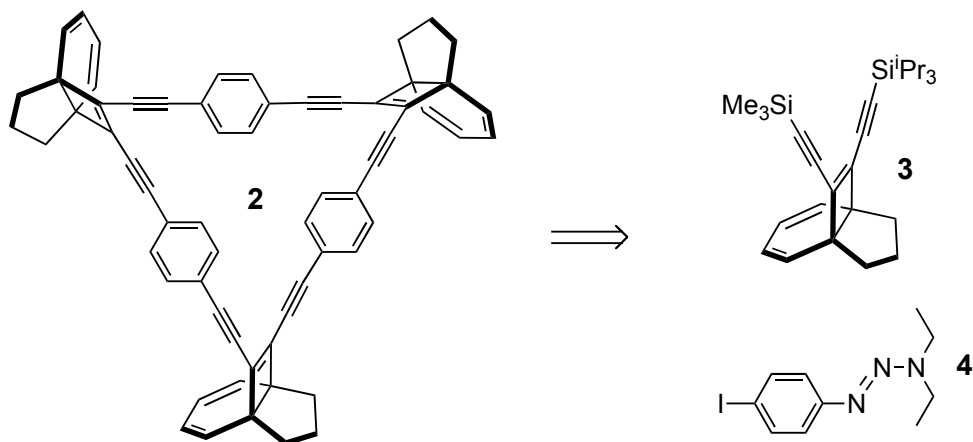


Bonus question: How could you prove the trimeric nature of the supramolecule?

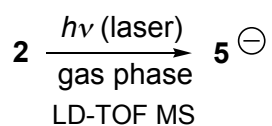
b. How would you prepare **1** using, among others, halogen derivatives of the nucleobases and tributylvinyltin? (Synthetic scheme including reagents, solvents, relevant reaction conditions.)

Problem 2

a. Propose a synthesis for macrocycle **2** (formed as major product next to cyclotetramer and cyclopentamer), starting from **3** and using, among others, component **4**.



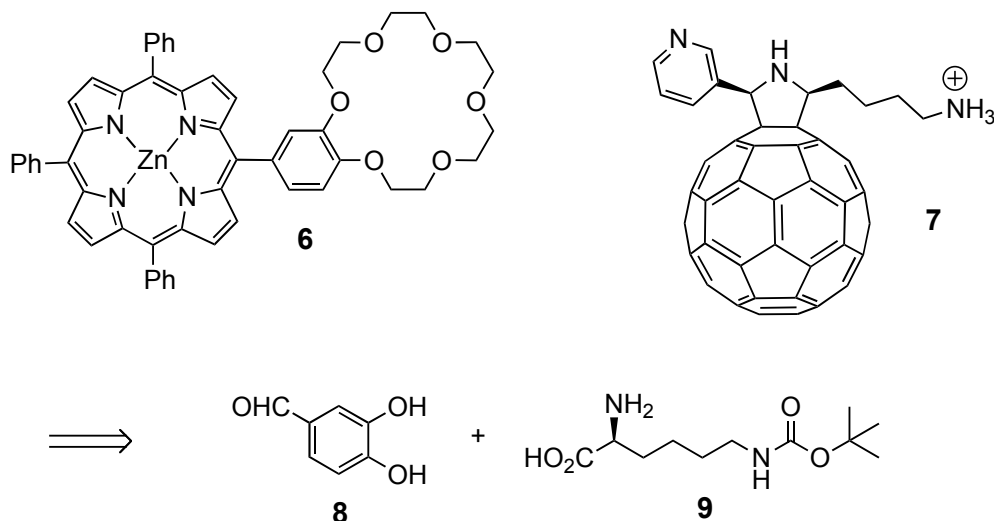
b. What is the structure of **5⁻**, generated from **2** under the conditions of laser-desorption time-of-flight mass spectrometry (LD-TOF, negative ion mode)? What is an important driving force for the observed reaction?



Problem 3

A supramolecular porphyrin-fullerene assembly **6·7** with defined distance and orientation of the components **6** and **7** was prepared as model system mimicking natural photosynthetic reaction centers.

a. Propose a synthesis for the components **6** and **7** using, among others, starting materials **8** and **9**. (You can represent the fullerene moiety by a simple circle in your reaction scheme.)



b. Propose a (schematic) structure for the supramolecular associate **6·7** and show the intermolecular interactions that are operative in the ditopic binding mode.

Problem 4

Propose a synthesis for hemispherand **10**, using the *Suzuki* cross-coupling reaction, and *p*-cresol methyl ether (**11**), as well as diethylene glycol (**12**) as main carbon sources.

